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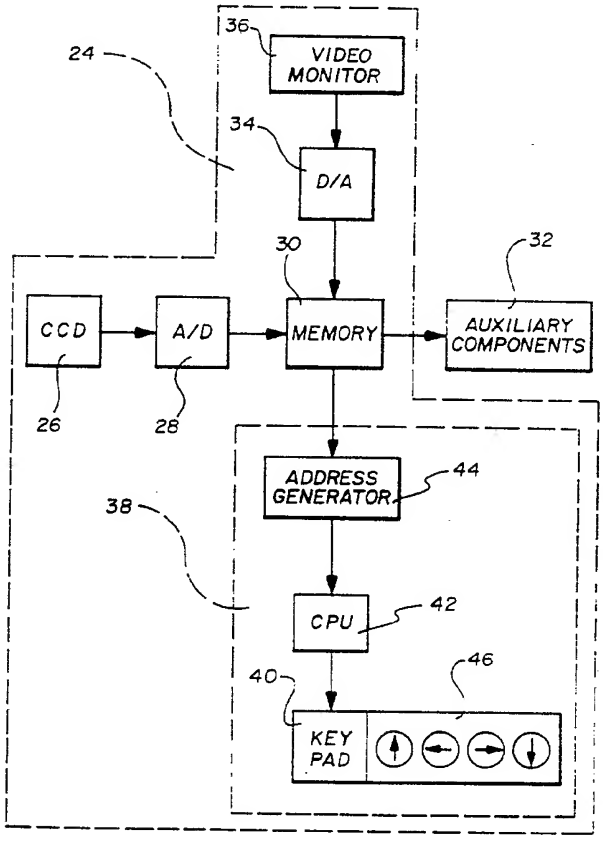
(54) Title: AN ELECTRONIC CAMERA COMPRISING A SCROLLING CAPABILITY

(57) Abstract

A digital electronic camera (24), that can compensate a mismatch between a high resolution image sensing means (26) and a nominally low resolution internal display (36) comprises a scrolling means (38), so that a preselected portion of an image captured by the image sensing means (26) may be displayed at full resolution, according the memory pixel starting readout address determined by the set of scroll control buttons (46).



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AN ELECTRONIC CAMERA COMPRISING A SCROLLING CAPABILITY

CROSS-REFERENCE TO A RELATED APPLICATION

This application is related to U.S. Patent Application Serial No. 07/690,751 filed April 24, 1991 by McGarvey, which is being filed contemporaneously with this application. The entire disclosure of this application is incorporated by reference herein. Each of these applications is copending and commonly assigned.

BACKGROUND OF THE INVENTION

This invention relates to an improved digital electronic camera.

INTRODUCTION TO THE INVENTION

Attention is first directed to Fig. 1, which shows a canonical digital electronic camera 10.

The camera 10 includes an imaging sensing means comprising a charge coupled device (CCD) 12. The CCD 12 can produce an electro-optical exposure, for input to a memory 14, and for ultimate viewing on an internal camera display 16.

SUMMARY OF THE INVENTION

Commercially available cameras of the type shown in Fig. 1, can now process, by way of the CCD 12, a high resolution digital image comprising a pixel array of, for example, 1280 x 1024 pixel size. Commercially available internal camera displays 16, in sharp contrast, generally have a qualitatively reduced resolution capability. For example, a typically available camera display 16 may comprise a low resolution 479 x 234 pixel size.

Heretofore, the mismatch between a high resolution CCD, and a low resolution internal camera

display, has been accepted by the industry, since the cited deficiency of the low resolution internal camera display can be offset by its small and convenient size, as well as its lower cost. At the same time, as shown in Fig. 2, it is known that the deficiency of a low resolution internal camera display may be partially offset, through an action of bypassing the low resolution internal camera display, in favor of auxiliary high resolution displays. Thus, Fig. 2 shows an extension of the Fig. 1 camera 10, comprising an auxiliary computer 18 inputting to an auxiliary high resolution video printer 20, or an auxiliary high resolution video monitor 22.

I have now recognized that a heretofore seeming trade-off between, on the one hand, a high resolution display, auxiliary to the camera, and, on the other hand, a low resolution internal camera display (albeit, one having the advantages of low cost and weight), are not mutually exclusive desiderata. Rather, I have now discovered a novel method and apparatus for enhancing the capability of the nominally low resolution, internal camera display, so that its virtues of low cost and weight can be retained, while at the same time, its effective resolution can be qualitatively upgraded.

The novel invention, accordingly, has a critical advantage of overcoming the cited deficiencies of mismatching the high resolution capability of the CCD, with the heretofore low resolution internal camera display.

Further, the novel invention gives the user of the camera an enhanced capability of viewing important information, and making decisions about what he sees, at full resolution strength.

Another critical advantage of the novel invention is that it can substantially reduce the area of an image to be transmitted, thereby effecting a substantial reduction in transmission times. This action, in turn, can result in a very favorable reduction in modem rates, as well as reducing possible detection dangers.

Accordingly, I now disclose an improved digital electronic camera comprising:

a) a high resolution image sensor for producing an electro-optical exposure;

b) a memory means connected to the sensor for storing the electro-optical exposure;

c) a nominally low resolution display connected to the memory means, for viewing an electro-optical exposure from storage in the memory; and

d) a scrolling means for identifying a subsumed portion of the electro-optical exposure stored in the memory, so that a full resolution data readout can be input to the display.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated in the accompanying drawing, in which:

Fig. 1 shows a canonical digital electronic camera;

Fig. 2 shows the Fig. 1 camera with auxiliary components; and

Fig. 3 shows a canonical digital electronic camera having an electronic scrolling capability.

DETAILED DESCRIPTION OF THE INVENTION

Attention is now directed to Fig. 3, which shows a canonical digital electronic camera 24 having an electronic scrolling capability. The structure of the camera 24 is first articulated,

followed by a disclosure of its operation.

The camera 24 includes an image sensing means comprising a charge coupled device 26. A preferred CCD 26 is available from Eastman Kodak Company, Model No. KAF-1300. This device is preferred because of its high resolution capabilities, namely, a 1280 x 1024 pixel size.

The camera 26 interfaces with a conventional analog to digital converter 28. The digital output of the converter 28 interfaces with a conventional memory 30, preferably, a memory comprising a D-RAM.

The memory 30 can provide two independent outputs. One output is to auxiliary components 32, comprising external high resolution video printers or external high resolution video monitors. The second output, by way of a conventional digital to analog converter 34, is to an internal low resolution video monitor (or image display) 36.

One example of an acceptable internal low resolution video monitor (36) is a Sharp Corporation Model LQ4RA01. This monitor accepts from memory 30 an approximately 479 x 234 pixel size.

As noted above, the present invention can overcome a deficiency arising from the mismatch between the high resolution CCD 26, and the low resolution internal video monitor 36. This is preferably effected by way of a scrolling electronics unit 38.

Fig. 3 shows that the scrolling electronic unit 38 preferably comprises a conventional key pad 40, a microprocessor or conventional central processing unit (CPU) 42, and a conventional address generator 44 which inputs to the memory 30.

The operation of the camera 24 is as

follows.

An operator of the camera 24 can preferably select a substantially rectangular portion of a high resolution digital image residing in the memory 30, for internal display, or external display by way of the auxiliary components 32.

A selected portion of the high resolution image conveniently fits on the video monitor 36 screen. A selected area, however, can be scrolled in both horizontal and vertical directions, i.e., to any desired location.

Operation of this scrolling function may be accomplished through a set of controls 46 on the key pad 40. The set of controls 46 comprise four scroll buttons (shown by arrows), which can position an image in each of four directions. The set of controls 46 also functions to control an address in the memory 30, where image data readout can occur.

The desired address determined by the set of controls 46, inputs to the CPU 42. The CPU 42 may be conventionally programmed (see illustrative Program, Appendix) to change a starting memory address, in accordance with the set of control 46 inputs. The CPU 42, accordingly, inputs this new starting address to the address generator 44. The address generator 44, in turn, preferably comprising a conventional pre-selectable counter, can provide a memory pixel address, for ultimate high resolution image data readout to the video monitor 36.

APPENDIX

Language PL-M

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Do Forever;
 IF (INPUT_KEY = UP) AND (START_ADDRESS > 1280)
   THEN START_ADDRESS = START_ADDRESS - 1280;

 IF (INPUT_KEY = DOWN) AND (START_ADDRESS < 1024*1280)
   THEN START_ADDRESS = START_ADDRESS + 1280;

 IF (INPUT_KEY = LEFT) AND
   (START_ADDRESS MOD 1280 > 1)
   THEN START_ADDRESS = START_ADDRESS -1;

 IF (INPUT_KEY = RIGHT) AND
   (START_ADDRESS MOD 1280 < 1279)
   THEN START_ADDRESS = START_ADDRESS +1;

 ADDRESS_COUNTER = START_ADDRESS;

END;
```

I CLAIM:

1. An improved digital electronic camera comprising:

a) a high resolution image sensor for producing an electro-optical exposure;

b) a memory means connected to the sensor for storing the electro-optical exposure;

c) a nominally low resolution display connected to the memory means, for viewing an electro-optical exposure from storage in the memory; and

d) a scrolling means for identifying a subsumed portion of the electro-optical exposure stored in the memory, so that a full resolution data readout can be input to the display.

2. The camera according to claim 1, wherein the sensor comprises a charge coupled device.

3. The camera according to claim 1, wherein the memory means comprises a D-RAM.

4. The camera according to claim 1, wherein the sensor comprises an approximately 1280 x 1024 pixel size, and the display comprises an approximately 479 x 234 pixel size.

5. The camera according to claim 1, wherein the scrolling means comprises:

a) a key pad comprising scroll capabilities for positioning the electro-optical exposure vis-à-vis the display;

b) a computing means connected to the key pad, for computing and defining memory addresses based upon the key pad positioning; and

c) an address generator connected to the computing means, for inputting to the memory means the memory addresses defined by the computing means.

FIG. 1

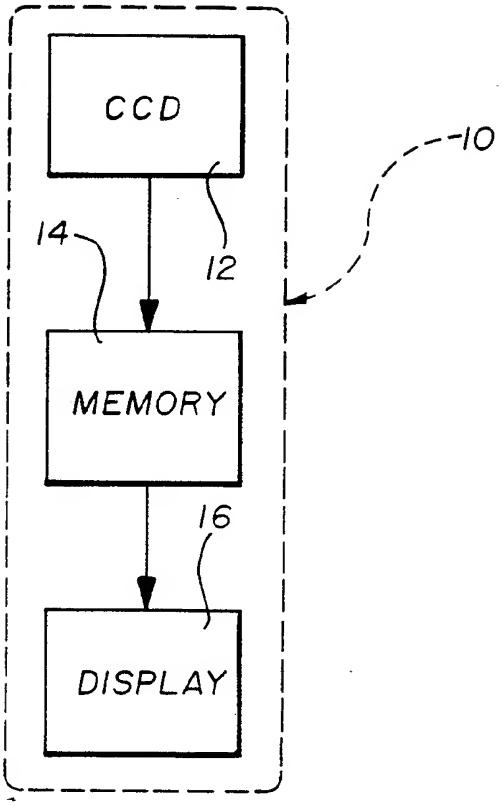

CCD
10
14
12
MEMORY
16
DISPLAY

FIG. 2

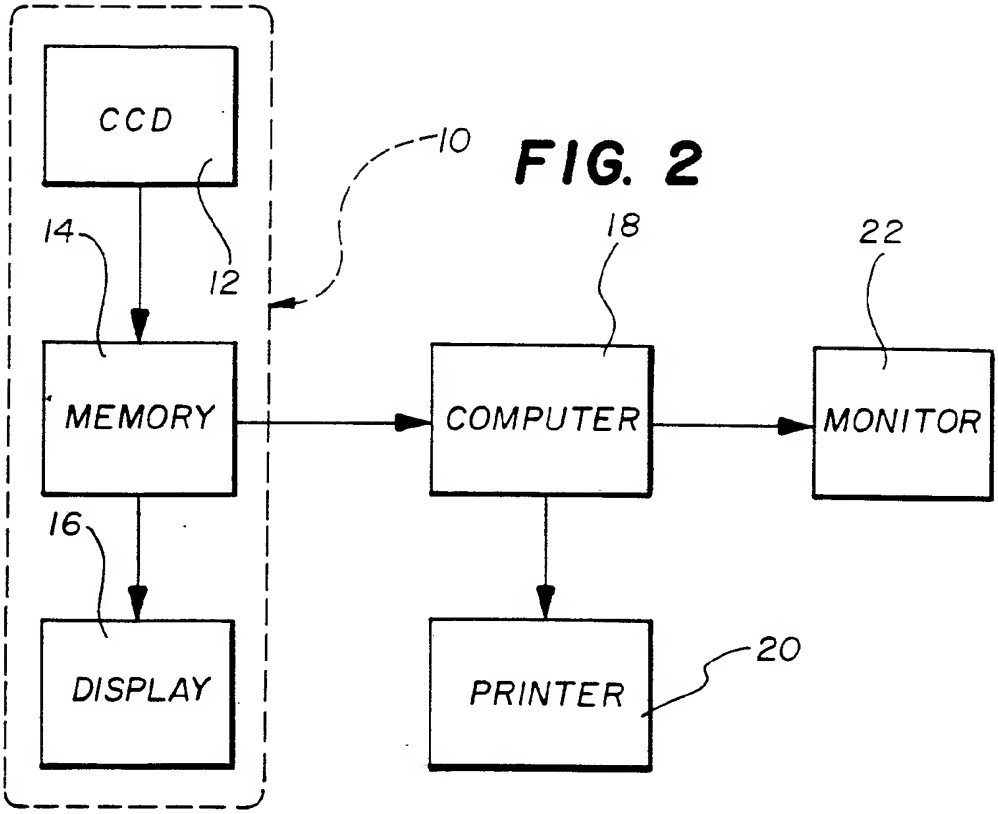
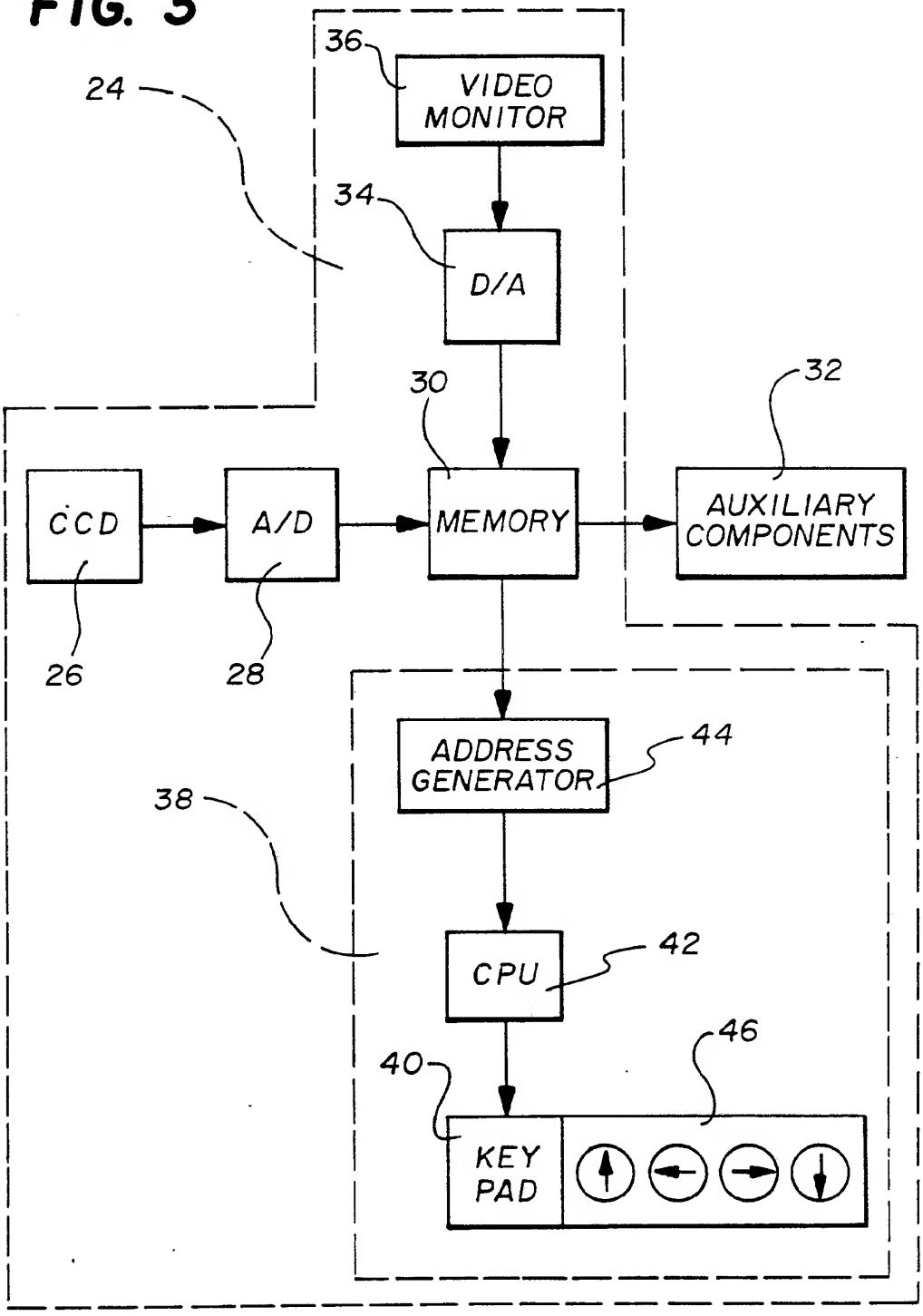

CCD
10
14
12
18
22
MEMORY
COMPUTER
MONITOR
16
DISPLAY
PRINTER
20

FIG. 3


36
VIDEO MONITOR
24
34
D/A
30
32
CCD
A/D
MEMORY
AUXILIARY COMPONENTS
26
28
ADDRESS GENERATOR
44
38
CPU
42
46
40
KEY PAD

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 92/03002

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 H04N5/262; H04N5/232

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	H04N5 ; H04N7 ; H04N1

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US,A,4 996 592 (YOSHIDA) 26 February 1991 see column 1, line 61 - column 2, line 38 see column 5, line 66 - column 7, line 2	1
A	---	3,5
A	US,A,4 746 980 (PETERSEN) 24 May 1988 see column 2, line 52 - column 4, line 8 see column 6, line 37 - line 66; figure 1	1,3,5

Y	EP,A,0 129 122 (POLAROID CORP.) 27 December 1984 see page 1, line 8 - page 3, line 2 see page 4, line 13 - page 8, line 30	1
A	---	2
	-/--	

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
17 AUGUST 1992	27. 08. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	DUHR R.H.J.E.

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
P,Y	PATENT ABSTRACTS OF JAPAN vol. 16, no. 23 (E-1157)21 January 1992 & JP,A,3 239 067 (SONY CORP.) 24 Cctober 1991 see abstract	1
A	---	5

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. US 9203002 SA 59278

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
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US-A-4746980	24-05-88	None	
EP-A-0129122	27-12-84	US-A- 4541010	10-09-85
		CA-A- 1247735	27-12-88
		JP-A- 60024781	07-02-85